Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supplementary Information for

Synthesis of branched surfactant from castor derivative and its surface properties

Qingwen Dong [a], Xu Li [a,*],and Jinxiang Dong [a,b,*]

[a] *College of Chemical Engineering and Technology, Taiyuan University of Technology, Taiyuan 030024, Shanxi, China*

[b] *School of Chemical Engineering and Light Industry, Guangdong University of Technology, Guangzhou 510006, Guangdong, China*

Table of contents

SI-1 GC analysis of the synthesized products 12-HSM and its physical image.

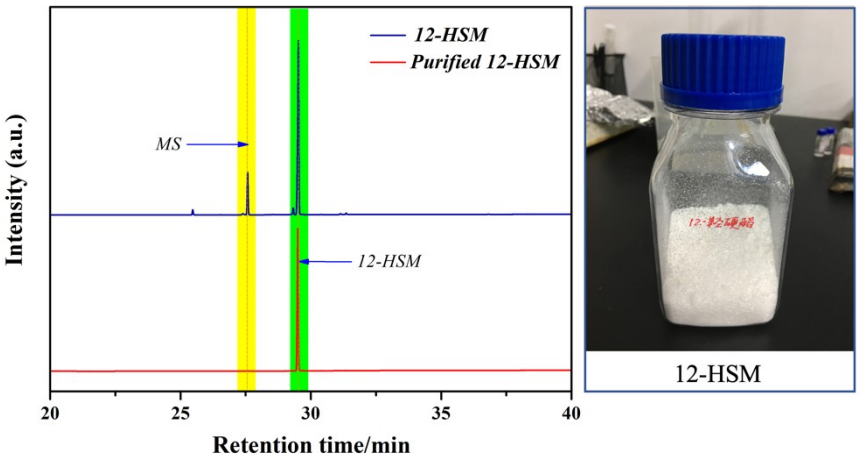


Fig. S1 *GC analysis of the synthesized products 12-HSM and its physical image. (MS stands for methyl stearate)*

SI-2 FT-IR spectra of 12-HSM and 12-HMEE$_n$

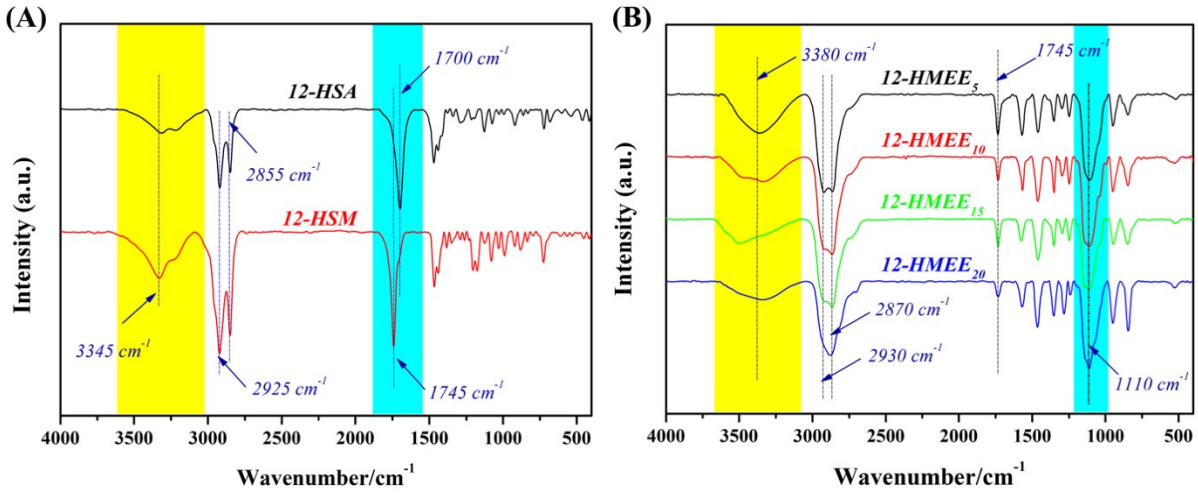
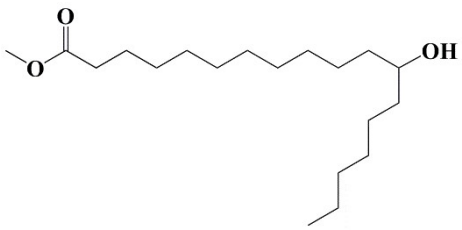
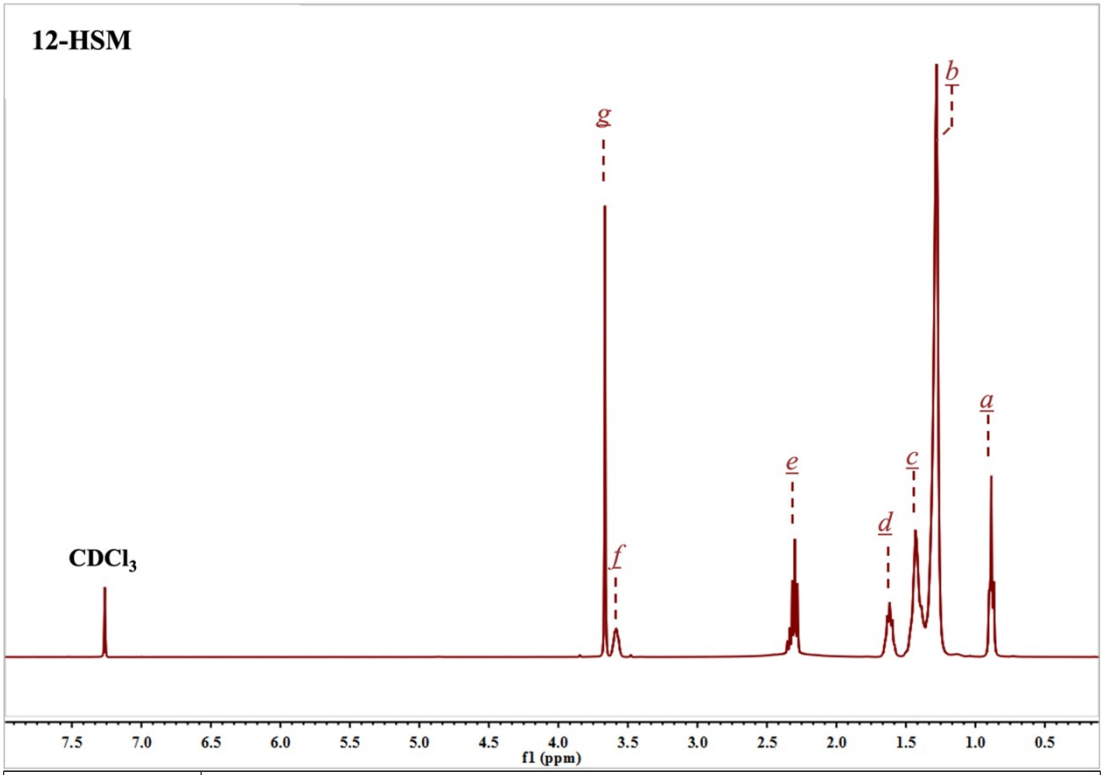


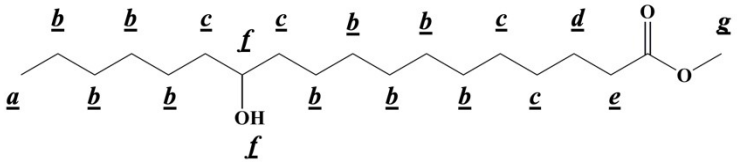
Fig. S2 *FT-IR spectra of products: (A) 12-HSM; (B) 12-HMEE$_n$.*

SI-3. ^{1}H NMR spectrum of 12-HSM.



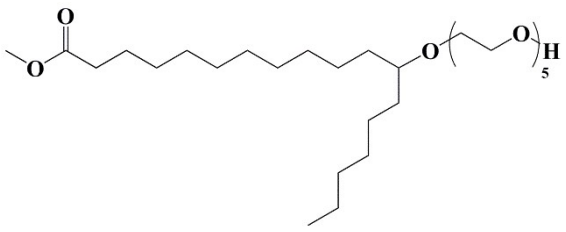
^{1}H NMR in $CDCl_3$



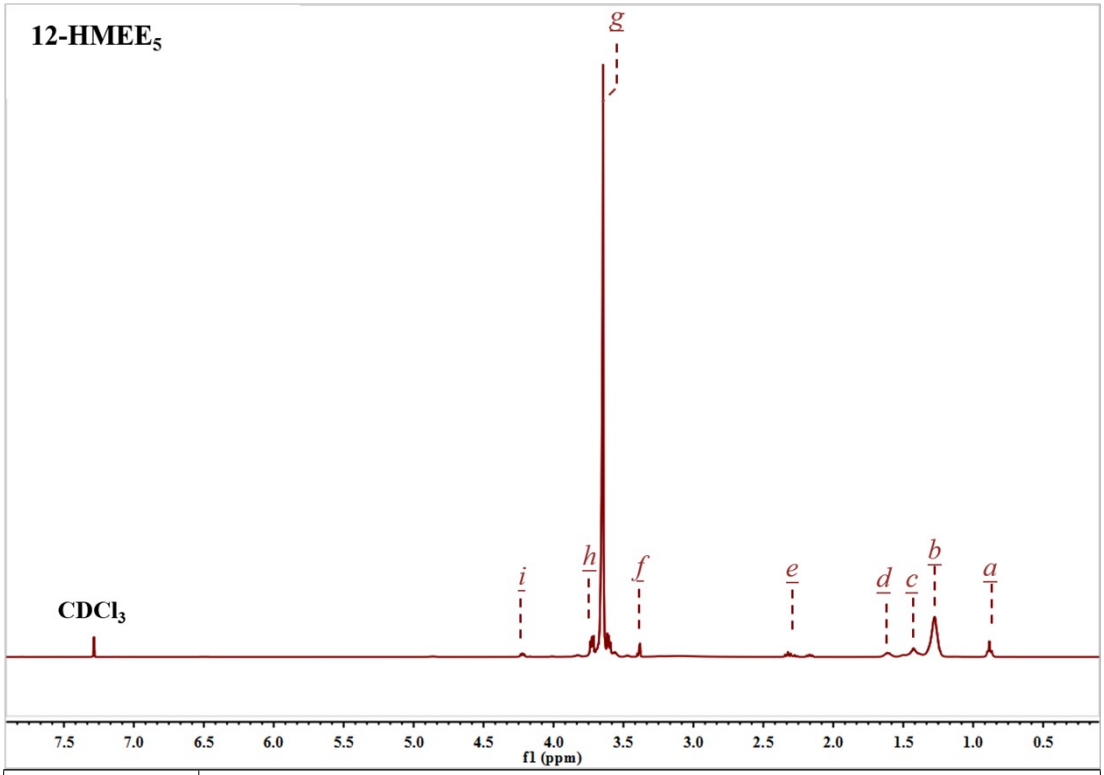
12-HSM	

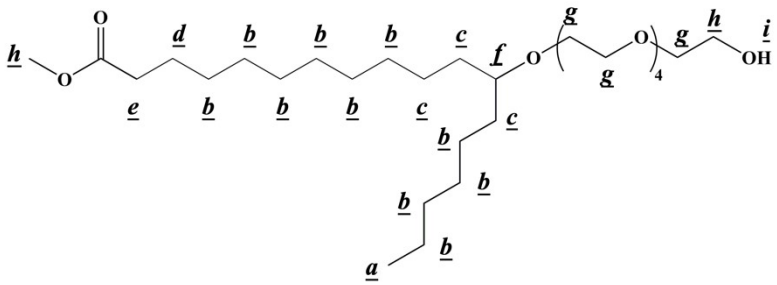
Entry	*Location of ^{1}H NMR Peak*	*Chemical Shift*	*Integral*
1	*a*	0.88	3H
2	*b*	1.28	18H
3	*c*	1.41	8H
4	*d*	1.59	2H
5	*e*	2.32	2H
6	*f*	3.55	2H
7	*g*	3.66	3H

SI-4. ^{1}H NMR spectrum of 12-HMEE$_5$.



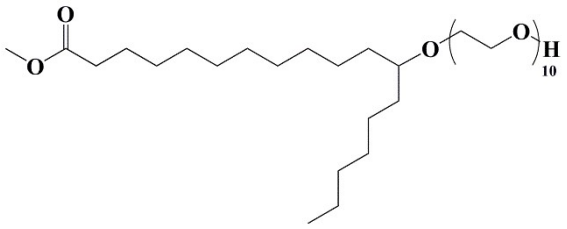
^{1}H NMR in $CDCl_3$



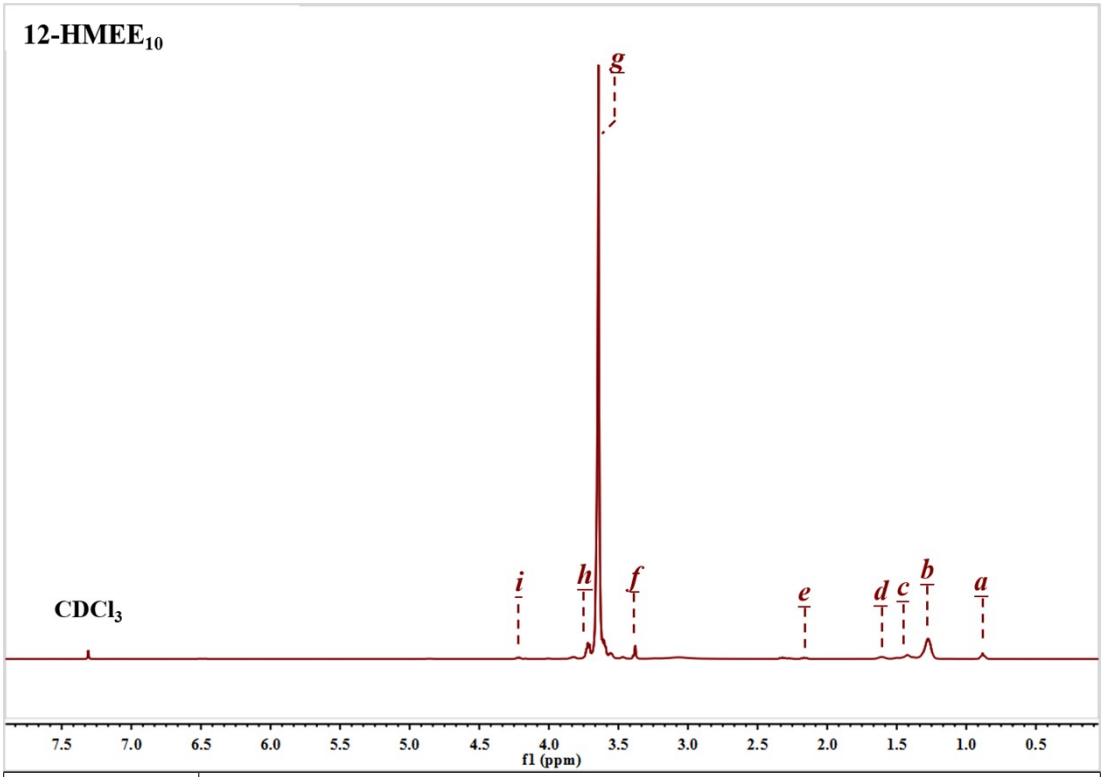
12-HMEE$_5$	

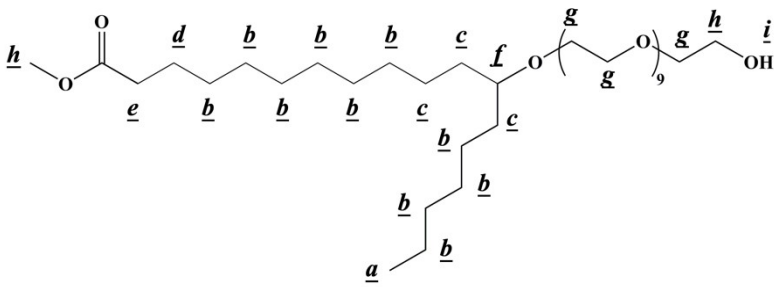
Entry	*Location of ^{1}H NMR Peak*	*Chemical Shift*	*Integral*
1	*a*	0.87	3H
2	*b*	1.25	20H
3	*c*	1.54 – 1.35	6H
4	*d*	1.58	2H
5	*e*	2.39 – 2.11	2H
6	*f*	3.42 – 3.33	1H
7	*g*	3.65 – 3.58	18H
8	*h*	3.77 – 3.65	5H
9	*i*	4.39 – 4.11	1H

SI-5. ^{1}H NMR spectrum of 12-HMEE$_{10}$.



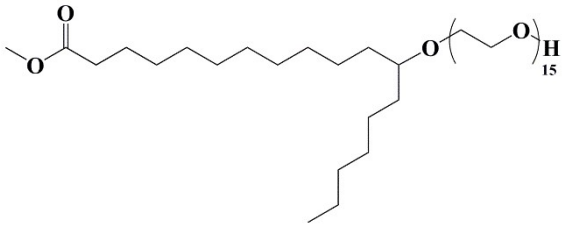
^{1}H NMR in $CDCl_3$



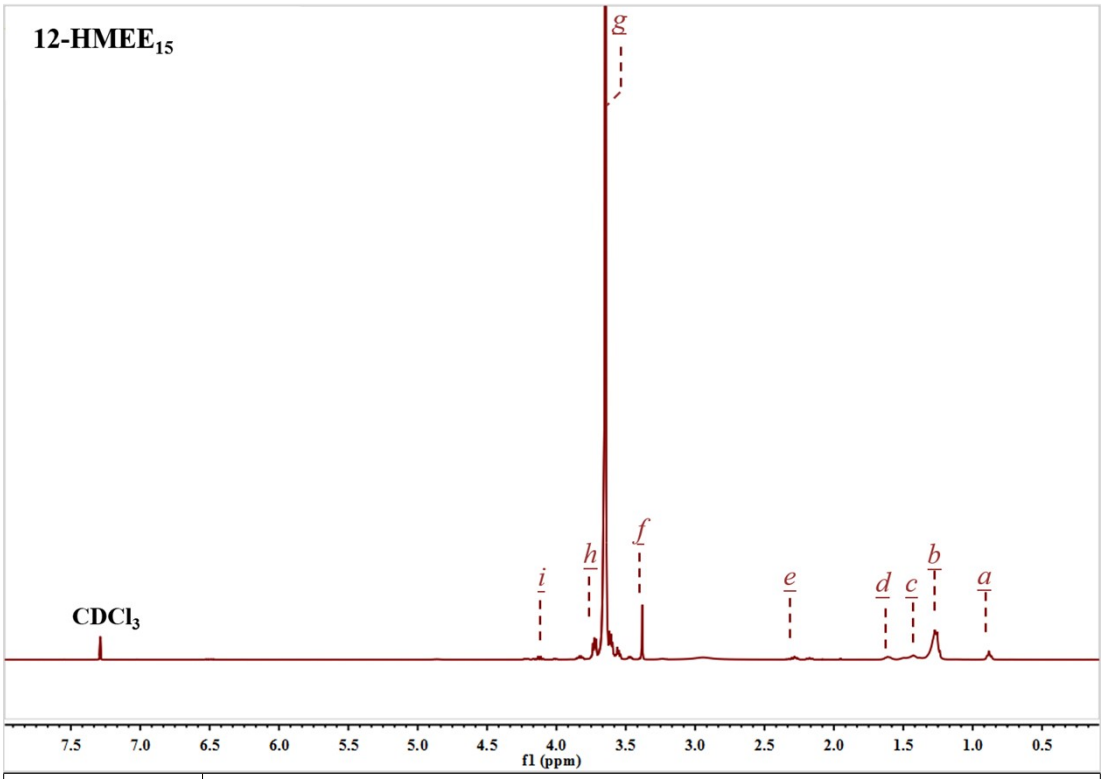
12-HMEE$_{10}$			
Entry	***Location of ^{1}H NMR Peak***	***Chemical Shift***	***Integral***
1	*a*	0.87	3H
2	*b*	1.27	20H
3	*c*	1.42	6H
4	*d*	1.58	2H
5	*e*	2.43 – 2.12	2H

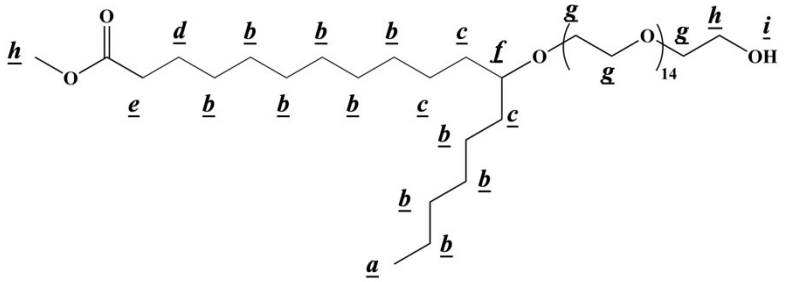
6	*f*	3.38	1H
7	*g*	3.68 – 3.57	38H
8	*h*	3.75 – 3.68	5H
9	*i*	4.32 – 4.14	1H

SI-6. ^{1}H NMR spectrum of 12-HMEE$_{15}$.



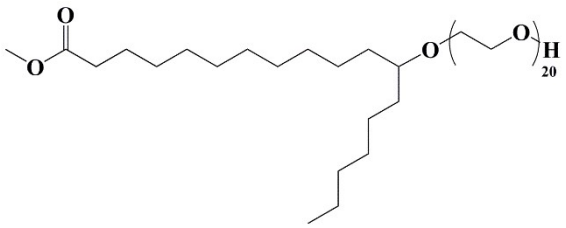
^{1}H NMR in $CDCl_3$



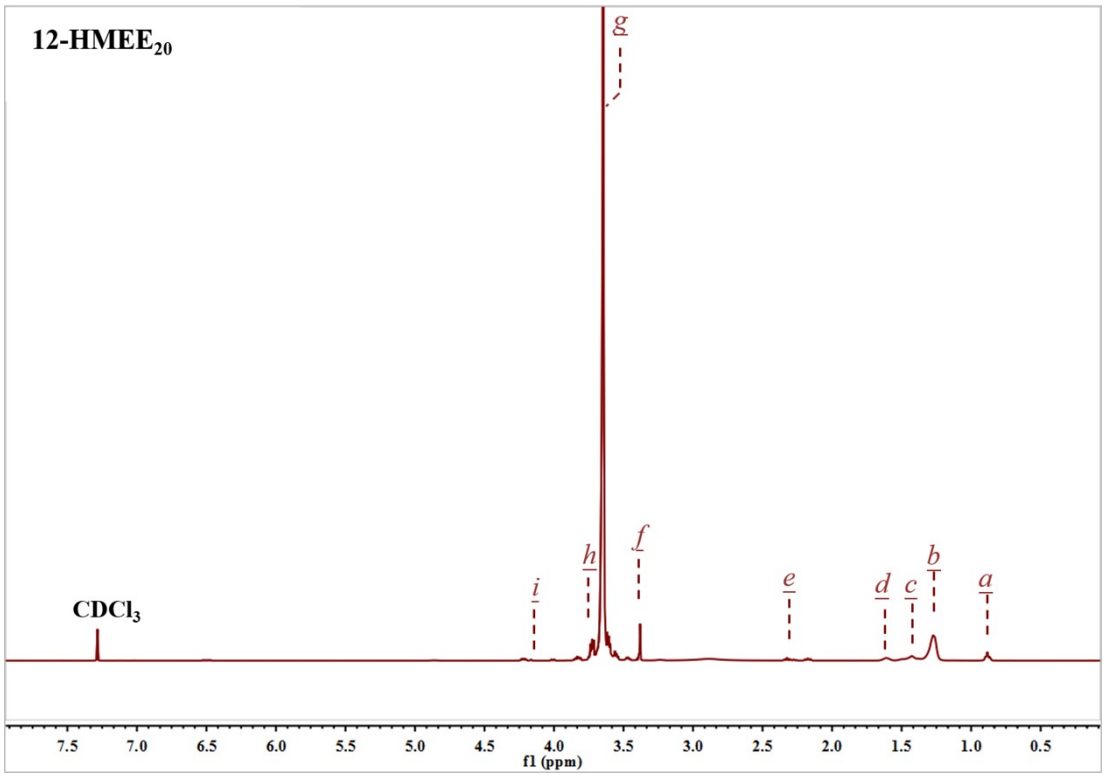
12-HMEE$_{15}$			
Entry	***Location of ^{1}H NMR Peak***	***Chemical Shift***	***Integral***

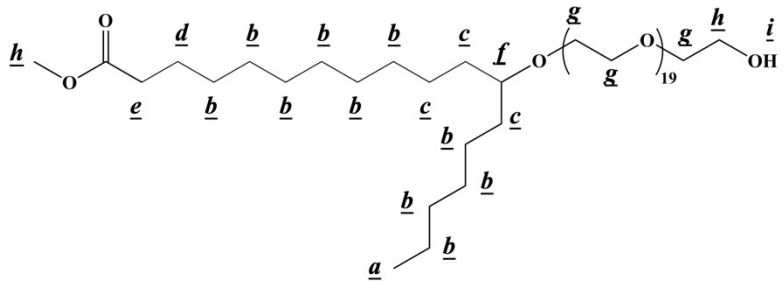
1	*a*	0.88	3H
2	*b*	1.26	20H
3	*c*	1.53 – 1.36	6H
4	*d*	1.68 – 1.54	2H
5	*e*	2.36 – 2.22	2H
6	*f*	3.39	1H
7	*g*	3.65	58H
8	*h*	3.71	5H
9	*i*	4.24 – 4.08	1H

SI-7. ^{1}H NMR spectrum of 12-HMEE$_{20}$.



^{1}H NMR in $CDCl_3$



12-HMEE$_{20}$			
Entry	***Location of ^{1}H NMR Peak***	***Chemical Shift***	***Integral***
1	*a*	0.88	3H
2	*b*	1.27	20H
3	*c*	1.44	6H
4	*d*	1.61	2H
5	*e*	2.39 – 2.09	2H
6	*f*	3.43 – 3.33	1H
7	*g*	3.69 – 3.58	78H
8	*h*	3.77 – 3.69	5H
9	*i*	4.30 – 4.08	1H

SI-8. Equilibrium surface tension of 12-HMEE$_n$.

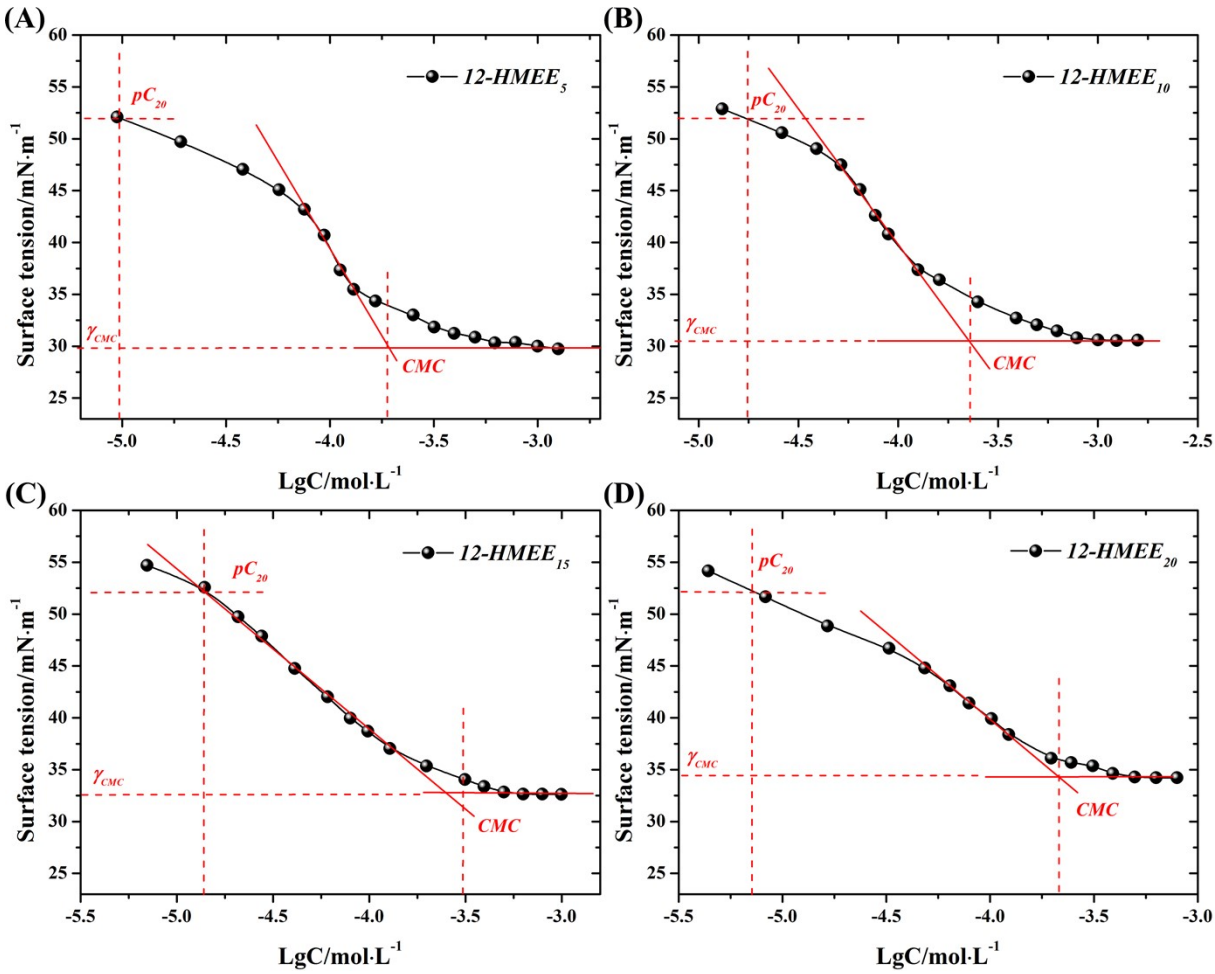


Fig. S3 *Equilibrium surface tension of 12-HMEE$_n$: (A) 12-HMEE$_5$; (B) 12-HMEE$_{10}$; (C) 12-HMEE$_{15}$; (D) 12-HMEE$_{20}$.*

SI-9. Dynamic surface tension as a function of short-term ($t^{1/2}$) for the 12-HMEE$_n$.

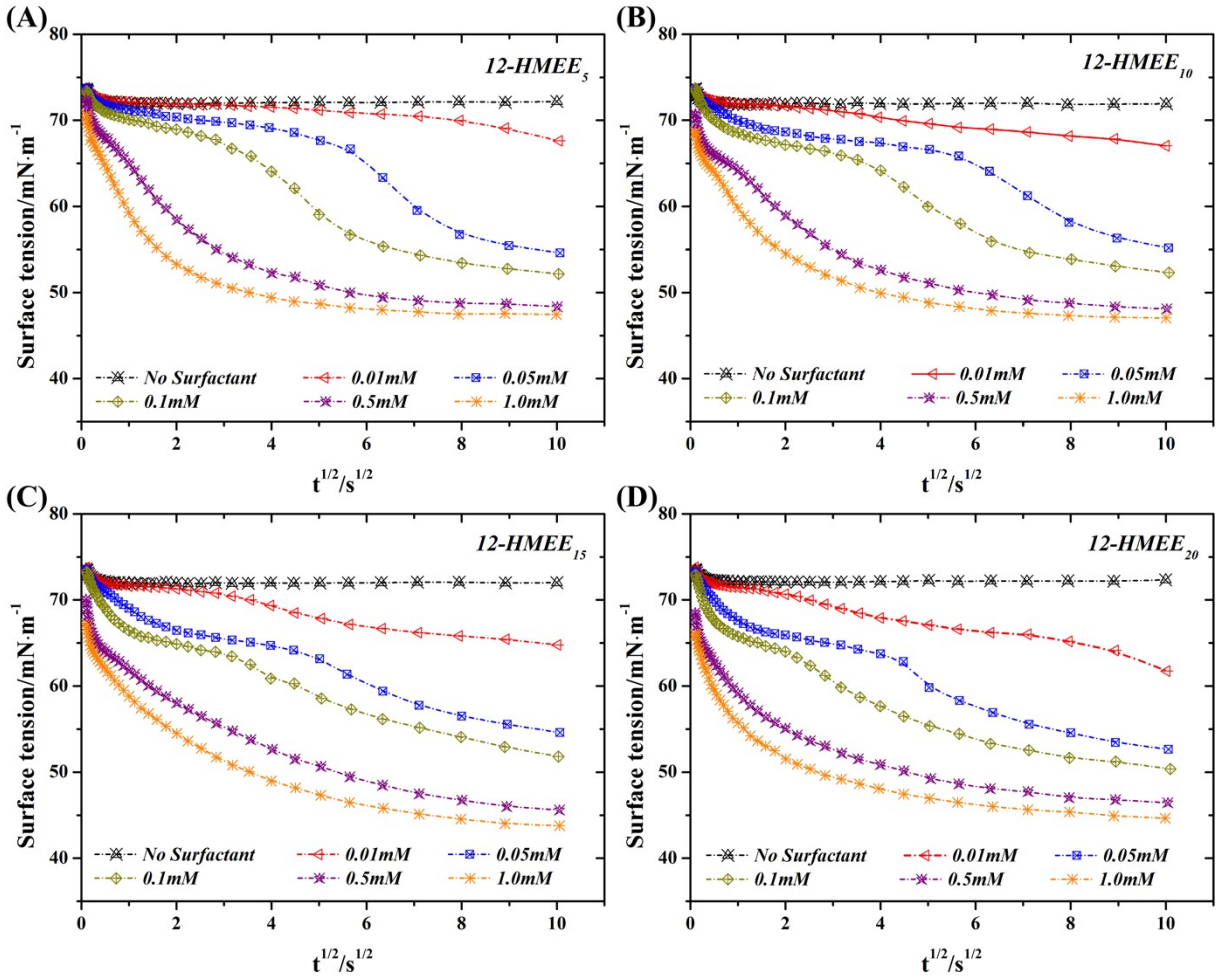


Fig. S4 *Short-term dynamic surface tension ($t^{1/2}$) of 12-HMEE$_n$: (A) 12-HMEE$_5$; (B) 12-HMEE$_{10}$; (C) 12-HMEE$_{15}$; (D) 12-HMEE$_{20}$.*

SI-10. Dynamic surface tension as a function of long-term ($t^{-1/2}$) for the 12-HMEE$_n$.

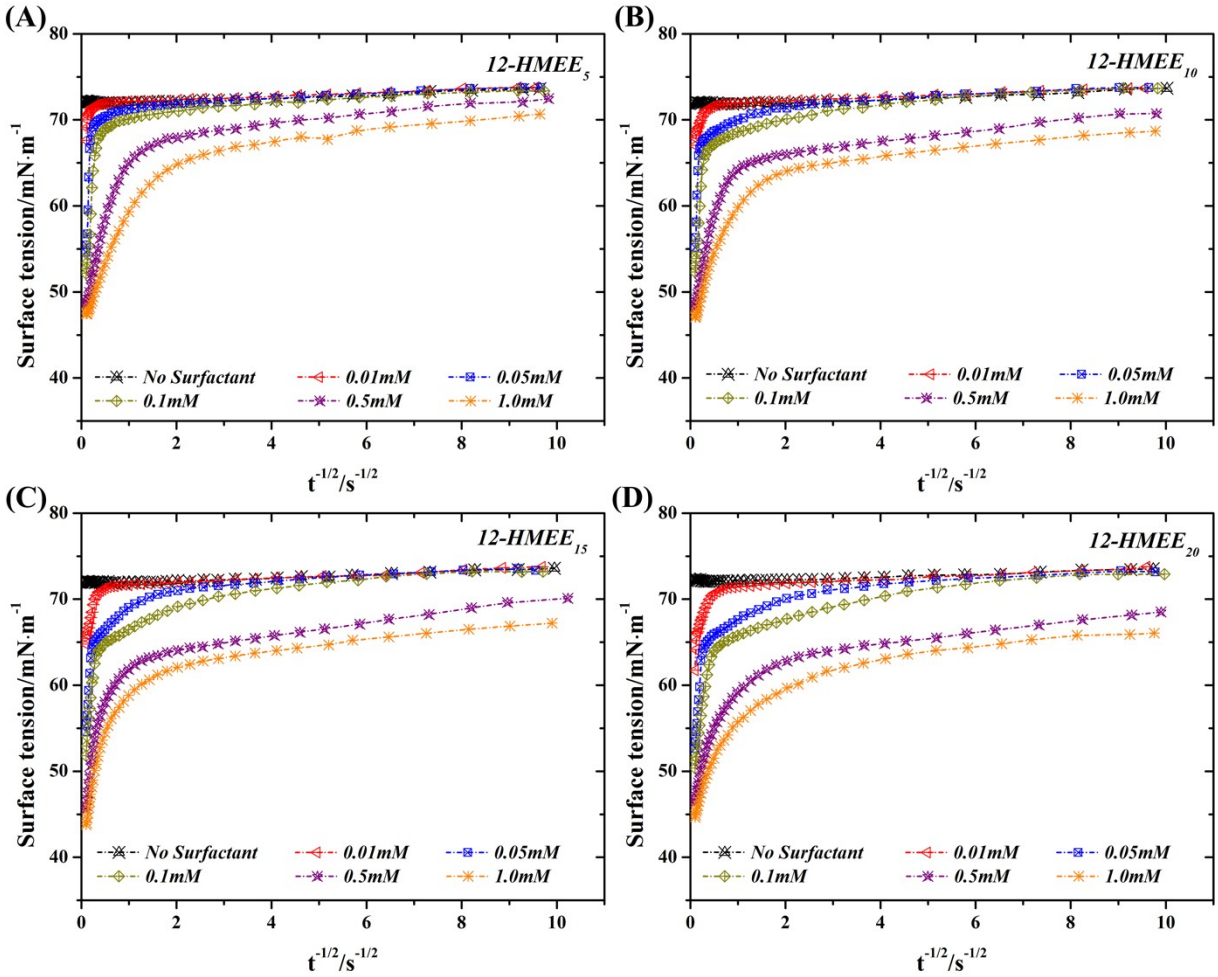


Fig. S5 *Long-term dynamic surface tension ($t^{-1/2}$) of 12-HMEE$_n$: (A) 12-HMEE$_5$; (B) 12-HMEE$_{10}$; (C) 12-HMEE$_{15}$; (D) 12-HMEE$_{20}$.*